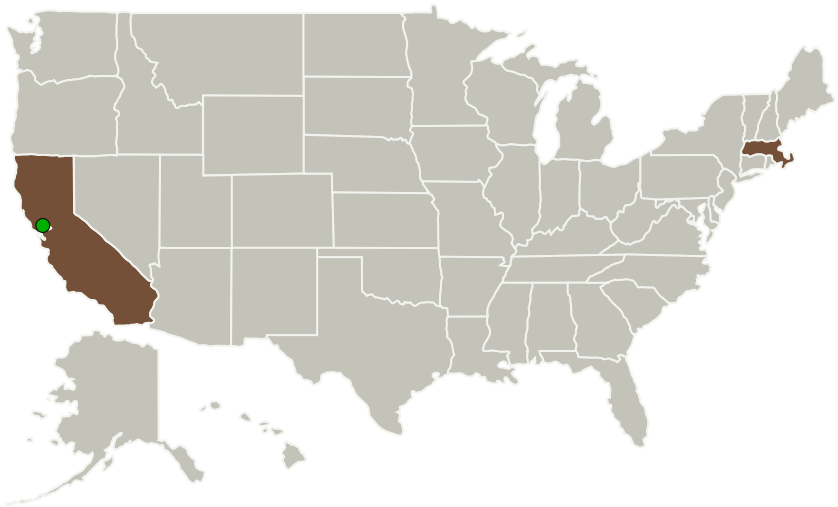
Causal Models for Safety Assurance Technologies, Phase I

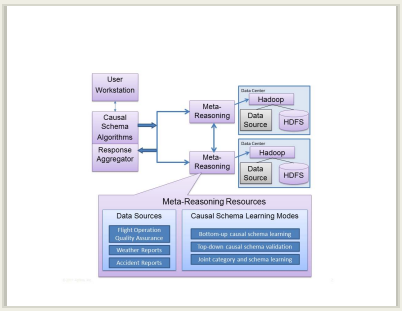
Completed Technology Project (2012 - 2012)

Project Introduction

Fulfillment of NASA's System-Wide Safety and Assurance Technology (SSAT) project at NASA requires leveraging vast amounts of data into actionable knowledge. Models of accident causation describe a causation chain. The chain would be better understood by examining the large amounts of "everyday" flight data, not just data proximal to high-profile incidents. This proposal is focused on the detection and prediction of more common flight errors or conditions which are necessary for aviation incidents. However, data sets containing safety information are (1) large, (2) distributed, and (3) heterogeneous, making analysis difficult. In order to address these challenges, we propose Causal Models for Safety and Assurance Technologies (CM-SAT). CM-SAT will mine large, distributed, heterogeneous data systems for causal relationships about flight safety. The system will identify causal schema within the data that characterize conditions related to the aircraft and environment that are predictive of failures. CM-SAT will detect causal relationships at varying levels of granularity (e.g. relationships which are unique to a particular flight, to a particular aircraft model, or to a particular fleet). It will leverage state-of-the-art distributed meta-reasoning, which will direct the causal schema learning algorithms to detect and validate causal relationships in different parts of the distributed data sets.

Primary U.S. Work Locations and Key Partners





Causal Models for Safety Assurance Technologies

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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Aptima, Inc.	Lead Organization	Industry	Woburn, Massachusetts
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

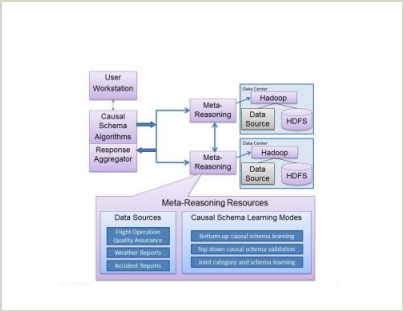
February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138029)*

Images



Project Image
Causal Models for Safety Assurance Technologies
(https://techport.nasa.gov/image/135384)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Aptima, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

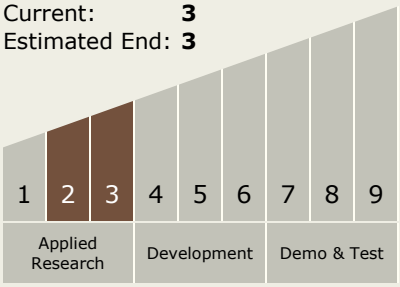
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Nathan Schurr

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  - TX16.6 Integrated Modeling, Simulation, and Testing

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System